

Incorporating
"The
Illuminating
Engineer."

Light *and* Lighting

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Another Session Begins

WE are once more on the eve of a **new Session** of the Illuminating Engineering Society, at the end of which it will have completed thirty years of existence.

On **October 11th**, at the Opening Meeting, there will be the usual **Display of Exhibits** illustrating progress — always a popular item. May we take this opportunity of giving members a **Final Reminder**—to send in to the Honorary Secretary, if possible by September 26th, particulars of **anything novel and interesting** which they would like to show.

The Society enters upon its new session with an additional Local Centre (with Headquarters at Birmingham), and yet another Special Section (devoted to Commercial Lighting). Officers and members of the five Local Centres should already be exploring means of getting new members. Those responsible for the five Special Sections should be considering possible recruits.

We would like to see a **Long List of Applications for Membership** for presentation at the Opening Meeting.

Will each member do his best to secure it.





A.P.L.E. Annual Conference

The Annual Conference of the Association of Public Lighting Engineers, held in Bournemouth during September 5-8, was, as usual, an agreeable event. The Exhibition afforded a good survey of developments in public lamps and lighting equipment, and the papers were of an unusually varied character. One was glad to note that on this occasion public lighting engineers more than contributed their share, three out of five papers being prepared by engineers responsible for the lighting of their respective areas—apart from the address of Mr. C. H. Woodward, public lighting engineer of Bournemouth, whose term of office as president has just commenced. Mr. E. J. Stewart, of Glasgow, who recently succeeded Mr. S. B. Langlands, the original president of the Association, as public lighting engineer of that city, is the president-elect. This Conference provides the chief opportunity during the year for experts on public lighting to get together. The attendance tends to increase continually—with correspondingly increased work for the organisers and for the secretary (Mr. H. O. Davies) and his staff.

Courses in Illuminating Engineering

It is now some months since we published a summary of the syllabus of examinations in illuminating engineering initiated by the City and Guilds Institute*. Some reference to this examination was made in Mr. Woodward's address to the Association of Public Lighting Engineers. It is of special interest to that body as a gateway to professional status for public lighting engineers. But there is no doubt that in the future it will become a hall-mark of value to those wishing to take up any position in the field of illuminating engineering. We are glad to be able to report two instances of courses specially designed to cover the syllabus of the City and Guilds examinations—at the Northampton Polytechnic, St. John-street, London, E.C.1, as advertised on p. 211 in the present issue, and at the South-East London Technical Institute, Lewisham High-road, London, S.E.4. Enrolment for both courses will commence immediately. We hope that both Institutes will be rewarded for their enterprise by good attendance.

* Light and Lighting, May, 1938, pp. 112-113.

Street Lighting: A Neglected Corner of Municipal Housekeeping

Under this title Mr. A. J. Sweet, a consulting engineer in the United States, whose contributions on street lighting are familiar to many British readers, recently made some very pertinent remarks in the "Municipal Index." He supports the contention that adequate urban street lighting throughout the United States would in 1937 have prevented 4,000 traffic fatalities and property losses amounting to 200,000,000 dollars. America's entire street lighting expenditure in that year was less than a third of these property losses. ["The public pays for adequate street lighting whether it has it or not."] The harassed public official will protest that cities cannot afford increased expenditure for street lighting. Mr. Sweet, however, contends that present street lighting practice is shockingly wasteful—it ought to be possible to provide a service two and a half times as efficient as at present without increase in expenditure and with fair profit to the utility undertakings concerned. The remedy is not to be found in some wonder-working lamp. It is, he suggests, unlikely that any such improvement within the next twenty years will reduce the cost of street lighting by more than 15 per cent. But he mentions four main directions of possible improvement and economy: (1) The employment of an adequate size of lamp—no conditions justify the use of smaller types than the 1,000-lumen lamp*, which are relatively very uneconomical. (2) The use of greater mounting heights, with attendant advantages in results. (3) The use of globes or reflectors which utilise the light efficiently; and (4) The adoption of a municipally-owned street lighting system. It is in this last direction that greatest scope exists. Economies effected when a municipality determines to own and finance the street lighting installation may suffice to give 20-50 per cent. better street lighting without increase in cost. At least a year before the current contract expires the municipality should obtain from competent sources, whose interest is to serve only the city's interest, an ultimate street lighting plan, instal every other or every third light of the ultimate system and note the results, and add further lights as the city can afford it. The effectiveness of properly designed street lighting should be at least doubled without extra cost. There are, it is suggested, less than ten cities in the entire United States for which this statement will not hold true.

* Presumably incandescent (filament) lamps.—Ed.

Progress in Public Lighting

Developments at the A.P.L.E. Conference held in Bournemouth during September 5th—8th

Another Large Attendance—Mr. Woodward's Presidential Address—Papers on Public Lighting, Air Raid Precautions and Artificial Illuminants — Exhibition of Public Lamps and Lighting Equipment—Social Events—Lighting of Bournemouth and the Royal Pavilion, Indoor Bowling Green, etc.

These notes on the proceedings at the Annual Conference of the Association of Public Lighting Engineers, held in Bournemouth during September 5—8, were necessarily prepared during the period of the conference. In what follows we give a brief summary of events, followed by abstracts of some of the papers read, which will be continued in our next issue.

The attendance—estimated at about 800—was again excellent, and it does seem that in future the provision of accommodation for the social events for such a large number will become a problem.

Bournemouth is a pleasant centre for a conference, and the renewal of this annual opportunity of meeting friends from all parts of the country interested in public lighting was appreciated by everyone.

On the opening evening (Sept. 6) there was the customary reception, held in the Pavilion, and on the following morning a welcome was extended by the Mayor (Councillor J. Bennett Beale, J.P.), who drew attention to important developments in the lighting and amenities of Bournemouth since 1929, the last occasion when members had there assembled. After the badge and certificate had been presented to the retiring President (Mr. C. I. Winstone) Mr. C. H. Woodward delivered his presidential address, which dealt largely with developments of lighting in Bournemouth (see p. 206). A paper on "The Ministry of Transport Final Report" was presented by Mr. J. F. Colquhoun (see p. 207), after which luncheon was taken in the Pavilion on the invitation of the chairman and directors of the Bournemouth Gas and Water Company. The toast of the Association was proposed by Lt.-Col. H. W. Woodall.

The afternoon was devoted to Mr. Thos. Wilkie's paper on "Air Raid Precautions and Lighting," which contained an instructive account of the special methods applied during the Leicester black-out, and led to a keen discussion. In the evening there was a conversazione in the Exhibition Hall, and, as an alternative, a supper, dance, and cabaret at the Royal Bath Hotel, on the invitation of the chairman and directors of the Bournemouth and Poole Electricity Supply Co., Ltd.

The second day was devoted to papers on "Public Lighting by Gas in Small Towns" (Mr. W. Hodgkinson) and "The Development of Street Lighting in a County Borough" (Mr. J. K. Brydges and Mr. N.

Boydell). In the evening the annual banquet and dance took place at the Pavilion. The toast of the Association was then proposed by the Mayor of Bournemouth, whilst Mr. E. C. Lennox undertook the toast of "The Guests." The banquet was an enjoyable event, and the speeches were, on this occasion, not unduly prolonged, leaving ample time for the dancing that followed.

The final paper, on the Thursday, by Mr. J. N. Aldington, dealt with "Radiation from Artificial Illuminants," after which there were coach trips to Poole, Alderney, Longham, and the New Forest.

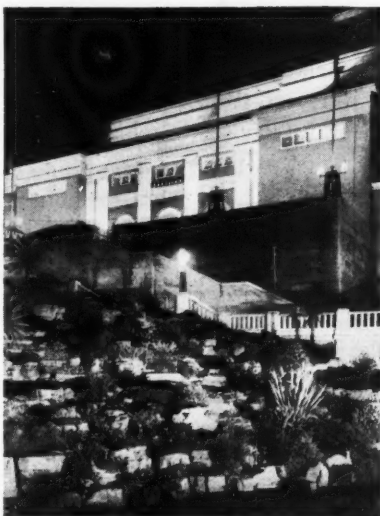
The conferences took place in the Town Hall, a portion of the interior being partially screened off for the use of exhibitors. It cannot be denied that this arrangement imposed some effort on the president in assembling audiences and limiting the occasional buzz of conversation in the exhibition area whilst meetings were in progress. On the other hand, the close proximity of the exhibition to the lecture theatre was doubtless an advantage to exhibitors, several of whom remarked upon the satisfactory attention which their display had received. There were about thirty firms participating in the display, which came quite up to the usual standard, many points of interest in connection with the design of lighting units being noted, though there was no very outstanding and novel advance.

Whilst there was, on this occasion, little effort to arrange displays of lighting in the streets (a wise decision, in view of this being an exhibition year) there was a good deal of interest in the usual decorative lighting of the town, notably the floodlighting of the Pavilion (erected since the last visit of the Association, at a cost of about £250,000) and the adjacent gardens, illustrated above. Another interesting bit of colour-floodlighting is the treatment of the fountains in front of the Pavilion. This, however, is not a new item, though a very effective one, having been inaugurated by the Edison and Swan Electric Company, Ltd., about the time of the Association's first visit in 1929. Another recently-erected building mentioned by the Mayor in his address of welcome is the indoor bowling green, lighted by Holophane units built into the ceiling, which we hope to illustrate in our next issue.

It was also interesting to observe how floodlighting and the use of luminous tube-designs, etc., originally regarded as evidence of extreme enterprise, has become quite a usual practice on the part of hotels in Bournemouth.

A word of congratulation should be tendered to the Secretary of the Association (Mr. H. O. Davies) on the convenient assembly of the combined programme and exhibition catalogue, in which a list of those attending the conference was included.

The President-Elect is Mr. E. J. Stewart, of Glasgow, where, it is understood, the 1939 conference will be held.



The Royal Pavilion and Gardens, Bournemouth, where the A.P.L.E. Reception and Annual Banquet took place, illuminated by OSIRA Colour Floodlights.

Presidential Address

by C. H. Woodward

The M.O.T. Final Report—Value of Trained Public Lighting Engineers—Development in Public Lighting in Bournemouth—Lighting the Pleasure Gardens—Early Inventions associated with Bournemouth—A. T. B. Control for Gaslighting—The Problem of Visibility—Lighting Amenities.

In the opening portion of his address Mr. Woodward remarked on the improvements in public lighting taking place all over the country, mainly due to the growth and increased speed of transport. In visiting towns, however, one was often struck by the amount of ill-arranged and misdirected light, some areas being unduly dazzling and others dull, gloomy, and unsafe. A better balance of lighting should be aimed at.

Two items available to local authorities which should aid them in getting this better balance are (a) the final report of the Ministry of Transport, and (b) the trained public lighting engineer to advise and carry out recommendations in the spirit of the report.

The Victorian idea of lighting is passing. In those early days the lighting inspector had leisure during daylight hours to collect the rates, ring the bell, and cry the news, wash down the steps and clean the windows of the town hall—in short, to do any job to warrant the provision of a heavier pay envelope on Fridays. To-day, the lighting inspector or superintendent is being superseded by the lighting engineer who must have a knowledge of chemistry, physics, electrical, mechanical, and gas engineering, must be capable of organising and must possess business ability. Nevertheless, it is still not unusual to find towns where the official employed to see that the town's purchases in light are equitable is an officer who devotes a few spare hours to the lighting.

On looking through the list of members of the association, it is strikingly apparent that in general their responsibility is spread over two or three totally separate activities. In such circumstances their best attention is necessarily given to the most urgent or clamant of their public services sections, which may or may not be public lighting. Such divided service is difficult to avoid in the smaller towns. But now that there exists a means whereby training may be certified by a diploma, the larger towns should appreciate the desirability of undivided attention being given to the lighting.

Having thus touched upon general topics Mr. Woodward proceeded to review the public lighting of Bournemouth. He recalled that in 1928 the luminous output was 9 million lumens, which in 1938 had become 24 million. When the scheme for the im-

proved lighting of Bournemouth is completed in 1948, the luminous output should attain 49 million lumens—nearly $5\frac{1}{2}$ times the 1928 output. The main roads are electrically lighted. Lanterns in the most important part contain a 400 w. mercury vapour lamp and two 150 w. filament lamps; in less important parts one 250 w. mercury lamp and two 75 w. filament lamps, mounted 25 ft. high and 114 ft. apart. On other traffic routes units comprising one 150 w. mercury lamp and two 40 w. filament lamps in asymmetric prismatic refractor bowl lanterns 22 ft. high are being used. About eight miles of roadway, to be ultimately extended to fifty miles, are thus lighted. By-road lighting is effected by two-light and three-light gas lamps, on which about 6,000 are in use. Under a scheme in progress three-light suspension lamps with asymmetric glass dish refractors will be substituted so that the lighting may comply with the recommendation of the M.O.T. Report for Class B lighting.

In addition to the lighting of the streets, attention may be drawn to the scheme for lighting the beds in the flower pleasure gardens; for which a very robust and completely earthed fitting has been designed. The ends of the tubular lamps are soldered in position so that the whole fitting is lifted when a lamp is to be replaced. The inverted trough shape of the fitting ensures the least obtrusive appearance in daylight as well as the best lighting effect by night.

Many advances have been tried out originally in Bournemouth, which played an important part in the early development of wireless telegraphy. The synchronising and paralleling of several alternators on station busbars was largely developed in the early days of electricity in a station supplying Bournemouth, a feature which has since culminated in the "grid" wherein super-stations all over the country are synchronised and paralleled. British electrically produced calcium carbide was developed in the only street in Bournemouth, and these early experiments led to the ultimate development of the British industry. A member of the Bournemouth Council, the late Councillor John Gunning, was the inventor of the first clock-driven street lamp gas lighting controller, which has resulted in a small flourishing industry within the town. An outstanding feature in connection with gas supply in Bournemouth was the vertical gas-making retort, which has now largely superseded the old horizontal form both in Great Britain and throughout the world.

Mr. Woodward next referred to the pioneering work of the Bournemouth Gas and Water Company in the use of the aeration test burner, with the object of getting the whole of their supply under A.T.B. control. The flame size, under A.T.B. control, will be kept within a small tolerance, and it will be necessary for makers of gas mantles to attend to the problem of ensuring that they get the flame.

In his final remarks the President touched on several important general topics such as the defining and testing of visibility and the importance in this connection of background, the disturbing effects on road-brightness, of variations in road surface, in particular those arising in road-patching, and the desirability of concerted action between town planners, architects, and lighting engineers in order to ensure an agreeable appearance of towns by night.

The M.O.T. Final Report on Street Lighting

Lack of Uniformity in Street Lighting—Basis of Classification of Roads—Mounting Height and Lumen Output—Central Suspension and Staggered Spacing—Spacing at Curves and Bends—Treatment of Dual Carriage-ways—Maintenance and Administration—Contributions from National Funds Necessary

In opening summarising views expressed on the M.O.T. Final Report on Street Lighting since its appearance last year Mr. J. F. Colquhoun said that some of the criticisms were reasonable—others not so reasonable. The committee had been criticised for failure to provide a "yardstick," by which installations could be measured and compared. The terms of reference of the committee did not ask them to do this. The various editions of the British Standard Specification had never been regarded as measures of the merits of installations; nor had the chief codes on street lighting in various countries been put forward as infallible guides.

TRAFFIC ROUTES AND OTHERS.

Mr. Colquhoun recalled the general recognition on the part of witnesses of the lack of uniformity throughout the country, which was most confusing to motorists. The broad division into traffic routes and all other types of roads seemed to be the best and simplest. It was intended that there should be a definite gap between the two ranges of lighting, so that motorists would be in no doubt when headlights were unnecessary. This distinction was effected by variation in (1) mounting height of sources and (2) quantity of light provided. The height for traffic roads—25 ft.—is one at which units can easily be mounted and maintained. Mr. Colquhoun did not agree with the view that greater heights and spacing distances might become usual in the future; an average spacing in excess of 150 ft. was clearly inexpedient. Dealing with (2), Mr. Colquhoun gave reasons why, owing to variation in the nature of roads, the limits for lumens for the two groups should be wide, and he recalled the clear warning in the report against the assumption that the lantern giving the greatest volume of light was necessarily most effective.

LANTERN OUTPUT IN LUMENS.

In regard to the suggestion that "lantern output in lumens" was not fully understood, the author suggested as an indication that efficient low-pressure gas lanterns using 500 B.Th.U. gas should give 160-200 lumens per cubic ft. of gas, and high-pressure lanterns 280-300. It was fairly safe to take the specified light output over life of electric lamps and deduct,

say, 30 per cent. for absorption of reflectors or refractors.

Dealing with spacing, overhang, and siting, Mr. Colquhoun pointed out that spacing exceeding 150 ft. was clearly intended to be exceptional. The siting of lamps, and particularly the choice between central suspension and staggered units, was the subject of some disagreement, though all witnesses agreed that confining the lamps on straight stretches to one side of the road results in defective lighting. On the whole, the staggered system was advised as the most suitable for general adoption on straight roads. It had been said that the reference to positions of lamps at curves and bends was not sufficiently explicit. For further details one must await the issue of the British Standard Specification. The aim should be to produce a white background, against which any objects on the roadway could be seen. With this in view lamps should usually be spaced on the outside of curves and bends. In cases where lamps at bends were mounted closer, "grading" the light output of sources with the object of maintaining the luminous output per 100 linear feet was, the author thought, undesirable.

DUAL CARRIAGEWAYS.

After discussing in some detail the lighting of roundabouts, Mr. Colquhoun referred to the effort to limit glare, remarking that there seemed to be unanimity of opinion that long spacing and high concentration did not cancel out! In regard to dual carriageways, it was suggested that where the width is more than 30 ft. or the central reservation more than 10 ft. wide, each carriageway should be lighted independently as a separate traffic route. But when these conditions do not apply Mr. Colquhoun suggested that lanterns mounted over the central area should be considered as contributing to the lighting of both carriageways, and their full light output should be included for both carriageways in the calculation of lumens per 100 ft. Dual carriageways should be separated by at least 10 ft.; otherwise lights were apt to become confusing. Where at all possible one lamp in the central area should give light to both roadways.

MAINTENANCE AND ADMINISTRATION.

The report emphasised the importance of satisfactory maintenance and approved the use of illumination measurements as a check. There must, however, be time for adjustment and tuning up, and it must be remembered that all light-sources do not deteriorate at the same rate during their effective life. Fuller details would no doubt be given in the British Specification.

In conclusion, attention was drawn to recommendations in the report bearing on administration to the suggestion that grants should be made out of national funds, and to the desirability of lighting committees being advised by a competent public lighting engineer.

DISCUSSION.

In the discussion Mr. H. W. Gregory, Mr. E. C. Lennox, Mr. E. E. Hoadley, Mr. J. M. Waldram, Councillor H. A. Benwell, Mr. C. H. Dobell, and others took

part. There was general agreement that the report should not be regarded as a "yardstick." Instances were given of lighting committees who continued to light their own streets by methods of their own which did not follow the lines of the report, and it was urged that compliance should be made a condition of the granting of loans. On the other hand, the need for assistance from national funds was illustrated by cases in which reasonably good lighting would increase the local rates by half a crown or more if the authority had to bear the entire cost.

Mr. C. H. Dobell emphasised the reference in the report to roads being lighted from dusk to dawn, and pointed out the value of light-sensitive automatic control in ensuring this condition.

Councillor Benwell remarked that not infrequently towns concentrated on the lighting of their main roads but left the by-roads—in which 80 per cent. of the population lived and paid rates—in comparative darkness. He also contrasted the treatment of road repairs and lighting costs, mentioning that in Bournemouth the lighting formed 36 per cent. of the total cost of upkeep of roads—and yet received no grant whatever.

THE EXHIBITION.

At the Exhibition, as indicated on a previous page, there was no very outstanding novelty, but developments in detail were shown by many firms, and at most of the stands ingenious models and methods of display were in evidence.

The names of the following firms appear in the official list: The Automatic Telephone and Electric Co., Ltd.; British, Foreign and Colonial Automatic Light Controlling Co., Ltd.; British Sangamo Co., Ltd.; British Thomson-Houston Co., Ltd.; Bromford Tube Co., Ltd.; Concrete Utilities, Ltd.; The Electric Street Lighting Apparatus Co.; The Engineering and Lighting Equipment Co., Ltd.; Foster and Pullen, Ltd.; The Gas Meter Co., Ltd.; The General Electric Co., Ltd.; Gowshall, Ltd.; Holophane, Ltd.; The Horstmann Gear Co., Ltd.; Keith Blackman, Ltd.; C. H. Kempton and Co., Ltd.; Kurt Erlach, Ltd.; Measurement, Ltd.; Metropolitan Vickers Electrical Co., Ltd.; Parkinson and Co.; Philips Lamps, Ltd.; Radiovisor Parent, Ltd.; Revo Electric Co., Ltd.; Stanton Iron Works, Ltd.; Siemens Electric Lamps and Supplies, Ltd.; Simpson (Rye Harbour), Ltd.; Simplex Electric Co., Ltd.; Walter Slingsby and Co., Ltd.; Stewarts and Lloyds, Ltd.; Wm. Sugg and Co., Ltd.; Venner Time Switches, Ltd.

The leading electrical firms showed a considerable variety of street lighting lanterns. We noticed particularly two new types shown by the General Electric Co., Ltd., so designed as to be very simple to handle and maintain, and several new forms based on the experience of Holophane, Ltd., in lighting Dublin and other cities, notably the "cut-off" type used in the well-known Merrion-road installation. (A parallel type of unit for gas lighting was shown at the stall of Messrs. Wm. Sugg and Co., Ltd.) Sodium and mercury discharge lamps were equally in evidence; Philips Lamps, Ltd., arranged their stall so as to feature both types of installations side by side, and had also on view an interesting little device, the Philips "visibility meter." Illuminated positives and photographs of lighting installations were a feature of most exhibits, and it is striking to note what progress has been made in this field during recent years.

Amongst the displays of makes of gas lamps, the new "Magnalux" lamp, introduced by Keith Black-

man, Ltd., a Folkestone last year (working on low pressure, but having the efficiency of a h.p. lamp), naturally attracted attention. There were also good displays at the stalls of C. H. Kempton and Co., Parkinson and Co., and Wm. Sugg and Co. Besides the "Folkestone" lamp, with its cut-off design, the "Sugg-Horstmann Series" Comet system of distant control attracted attention as a marvel of ingenuity which, it need scarcely be said, applies also to the time switches and other devices, many of them shown by the Horstmann Gear Company.

Interest in "A.R.P." no doubt accounts for the display of methods of control of street lighting and time switches, etc., which were shown in detail by the Automatic Telephone and Electrical Co. (A.T.M.), Measurement, Ltd. ("Actadis"), The General Electric Company, Ltd., and The British Sangamo, Ltd.

The latter also showed the familiar Weston light-meters.

In contrast to the above displays, Radiovisor Parent, Ltd., illustrated their special "dusk to dawn" control based on the use of the light-sensitive bridge, which has, of course, many other applications.

Some very practical devices for street lighting, such as extension pieces, the "Wask" suspension gear, etc., were shown at the stand of Walter Slingsby and Co., Ltd., and there was, outside the exhibition hall, a representative display of high posts in steel and concrete, prominent being those of the seamless tubular steel columns of the Bromford Tube Company, of which two distinct types were shown.

Mr. H. L. Juliusburger was present to introduce the General Lighting Information Service ("G.L.I.S."), a statistical review previously noted in these columns.

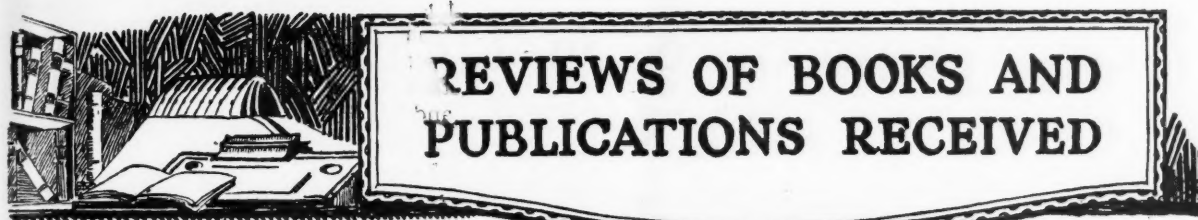
It was interesting to see that ultra violet radiation figured in quite a number of exhibits. The "Vol-spray" painting equipment of Kurt Erlach, Ltd., was well illustrated by the treatment of various objects with fluorescent material, and at the stalls of Siemens Electric Lamps and Supplies, Ltd., The General Electric Company, Ltd., and other small displays were staged showing the effects of the new "black light" lamps.

We intend to deal with the other papers read at the A.P.L.E. Conference in our next (October) issue, when fuller reference to the chief exhibits will also be made.

Outdoor Photometry

We are asked to mention that a discussion on the above subject will be opened by Mr. J. S. Dow at a forthcoming meeting of the Photometry Section of the Illuminating Engineering Society, to be held on November 29.

It is hoped that the opportunity will be taken by members of the Society interested in this subject to contribute their views and experiences. Contributors to the discussion are asked to send in their names to the honorary secretary of the Section (Mr. K. F. Sawyer, Watson House, Townmead-road, Fulham, London, S.W.6), mentioning the particular problems with which they propose to deal, so that some preliminary reference thereto may be made in the introductory address.



REVIEWS OF BOOKS AND PUBLICATIONS RECEIVED

Handbuch der Lichttechnik. Edited by R. Sewig. Julius Springer, Berlin, 1938. (2 vols.: pp. 1,056 + XXVI: 1,024 illustrations, with appendix including 59 tables: Pr. 120 marks.)

These two volumes provide an encyclopaedia of illuminating engineering. The editor informs us that the period from the enlistment of his forty colleagues to the appearance of the volumes was about eighteen months. This in itself is somewhat of an achievement and is to be taken as indicative of the zeal of the editor and his colleagues in carrying out what was for the former a long cherished idea. It is also indicative of the up-to-date character of the work in a subject in which progress is rapidly being made.

To deal with forty colleagues and to allocate their various responsibilities is quite a problem which seems successfully to have been met, as the divisions of the subject are well chosen, and there is very little overlapping of effort. Most of the authors are familiar in name to British readers. The main usefulness of these volumes to British engineers will be as a work of reference, as their price is somewhat above what the normal reader is prepared to give for knowledge, however valuable. The treatment of the various sections in the first volume and to a necessarily lesser extent in the second, is, however, such that they could be used as text books for the more advanced type of student.

The first volume is more theoretical in treatment than the second, which is almost purely technical. It deals with the fundamental principles underlying illuminating engineering, photometric units and definitions, physiological considerations. These are followed by a long section dealing with the theoretical and physical aspects of light production as realised in the various types of light sources, including daylight. Sections then follow on photometric measurements (visual and physical), heterochromatic photometry, colorimetry; and, finally, there is a section on the optical properties of materials used in illuminating engineering. This first volume will be of most use to English readers.

The second volume is purely technical and deals with all types of lighting equipment and their use for various purposes, such as factory lighting, decorative lighting, mine lighting, and as indicative of up-to-dateness, air raid precaution lighting. Advertising signs are dealt with, as are all types of light sources used in connection with transport by sea, land, and air. Then, as further evidence of completeness, it may be mentioned that the electrical side of cycle lighting is considered and that rear reflectors have a special section devoted to them. Finally, there is an account of the principles of light therapy, followed by descriptions and particulars of various light sources, and a section on dosage or the measurement of ultra-violet light for therapeutic purposes. An index includes fifty-nine tables of constants and data useful in illumination work. References are plentiful and appear fairly complete.

The volumes are a welcome addition to illuminating engineering literature, and, provided progress is not too rapid, will serve a very useful purpose for several years to come.

Comptes Rendus du Congrès International des Applications de l'Eclairage, Paris, 1937. Edited by Jean Dourgnon. (La Revue Generale de l'Electricite, Paris, 1938. Pp. 346.)

This volume summarises the proceedings at the International Congress held in Paris during June 23 to June 29, 1937. The chief topics dealt with comprised public lighting, sources of light, lighting calculations, natural lighting, and the lighting of schools and factories, the use of light in connection with medicine and surgery, decorative lighting, and propaganda in the interests of better lighting. Visits were also paid to the Exhibition and elsewhere. Nearly fifty papers and contributions are on record, so that it is possible to give only a very general idea of the contents of the volume. Most of the papers are illustrated, more especially the series dealing with spectacular lighting at the Exhibition and exterior decorative lighting. (Dr. N. A. Halbertsma's contribution on this subject contains many

effective pictures, and it is interesting to note the development of modern methods in Japan.) A useful contribution by a British contributor was Mr. P. J. Waldram's paper on the measurement and prediction of natural lighting.

Elektrische Gasentladungslampen. By Dr. W. Uyterhoeven and K. W. Hess. (Julius Springer, Berlin, 1938. Prices: unbound, RM. 36.40; bound, RM. 34.)

The ever increasing use of electric discharge lamps has created a need for a general treatise on these light sources which is admirably filled by this book.

The opening chapters consist of an advanced exposition of the physical principles upon which depend the phenomena of electrical conduction through gases and the consequent excitation of the atoms. The spectra of those elements in common use for discharge lamps are analysed in detail, and, in the case of the mercury spectrum, the importance of metastable levels, and the effect of increase of pressure on the continuous spectrum are discussed.

The general principles of photometry and colorimetry are set forth, and the special photometric problems arising out of the coloured nature of gas discharge sources are given detailed attention.

The remaining part of the book is devoted to the description of modern forms of electric discharge lamps and the auxiliary gear associated with them. The standard commercial types of sodium and mercury vapour lamps are treated very fully, and mention is also made of recently developed super high-pressure mercury vapour lamps, which, however, do not appear as yet to have found wide application. The improvement of the colour of the light from these sources by mixture with tungsten lamps, and by the application of fluorescent materials, is treated briefly, though in this connection no mention is made of the recent developments in cold cathode tubes for interior lighting.

Although some examples are given of the application of discharge lamps to practical lighting problems, as the title of the book would suggest, no attempt is made to go into details of optical design for the special equipment which is frequently required.

The arrangement of the book is excellent, and strikes a good balance between the needs of the pure scientist and the commercial lighting expert.

Service Charges in Gas and Electric Rates. By H. F. Havlik. (P. S. King and Son, Ltd., London, 1938. Pp. 234, price 12s. 6d. net.)

The author, as an instructor in economics at Columbia University, naturally reviews this problem in relation to American conditions. It will be noted, however, that he bears in mind the problems of both gas and electricity undertakings, and from a broad standpoint, so that the book is of evident interest to English readers. In the course of eight chapters the origin and development of tariffs is studied exhaustively. He shows, by means of comparative tables, how greatly the "service charge" (which broadly represents an initial charge based on demand or other factor, plus a specified charge by meter) has gained in popularity during recent years—amongst supply undertakings, that is—for he confesses that the chief objection to the method is its unpopularity with the public! One suspects, however, that the objection—in this country, at least—is largely due to suspicion arising from the extraordinary variety in methods of charging in different areas, and still more the offer of alternative or discriminating systems in the same area. The book, in short, rather confirms the impression that the effort to establish completely scientific basis of charging has been overdone, and that the simplification and standardisation are extremely desirable—even if it may be impossible to return to the grand simplicity of the original "flat-rate," a fixed charge per quarter, irrespective of meter-readings. Useful appendices discuss (a) The Amount a Consumer Costs, (b) The Effect of Increased Appliance Use on Domestic Consumption, and (c) The Relationship between Rates and Consumption.

Literature on Lighting

(Abstracts of Recent Articles on Illumination
and Photometry in the Technical Press)

(Continued from page 192, August, 1938.)

I.—RADIATION AND GENERAL PHYSICS.

218. On the Rôle of Tube Walls and Surface and Space Charges in Electrical Discharges through Rarefied Gases.

John Zeleny. Frank. Inst., J., 226, pp. 35-65, July, 1938.

The part played by tube walls and surface and space charges in electrical discharges through rarefied gases are discussed at some length, and experiments are described throwing light on processes involved. The distributions of space and surface charges were measured separately, and experiments were made with metal tubes in the path of the discharge, as well as with the normal glass-walled tubes. S. S. B.

II.—PHOTOMETRY.

219. A Portable Photometer without a Diffusing Screen.

J. Hrdlicka and J. Krombholz. Rev. d'Opt., Vol. XVII., No. 1, p. 28, January, 1938.

A portable telephotometer, of which the photometer and control box are built into one unit, which is mounted on a tripod when set up for use. The comparison field of the photometer is varied in brightness by means of an optical wedge.

220. The Spectral Sensitivity of the Eye.

Drester. Zeits. f. Techn. Physik, No. 7, p. 206, July, 1938.

Recent data on the spectral sensitivity of the eye is discussed and applied to the photometry of coloured light sources. W. R. S.

221. Spectral Transmission of Absorbing Screens for the Sensitometry of Photographic Plates in Photographic Photometry.

G. Déjardin and D. Cavassilas. Rev. d'Opt., Vol. XVII., No. 2, p. 41, February, 1938.

A technique, employing a photoelectric cell with triode amplifier, for measuring the transmission of optical filters and wedges for photographic purposes. The transmission of various types of metallic deposit on quartz has been measured to monochromatic light of wavelength from 3000—10,000 Å.

222. Reflection and Transmission Factors of Thin Metallic Foils. Part I.

P. Rouard. Rev. d'Opt., Vol. XVII., No. 1, p. 1, January, 1938. Rev. d'Opt., Vol. XVII., No. 2, p. 61, February, 1938.

The first part of a series of three papers. This paper deals with methods of preparing thin metallic foils, and of means of measuring their reflection and transmission factors. A visual method; a method employing a photoelectric cell or a thermopile, and a photographic method are described. R. G. H.

III.—SOURCES OF LIGHT.

223. Improvements in the Low-Pressure Mercury Vapour Lamp.

R. C. Kelting and L. J. Buttolph. Am. Illum. Eng. Soc. Trans., 7, pp. 643-655, July, 1938.

This paper gives a description of the recent improvements in automatic starting, efficiency, and operating characteristics of the low-pressure mercury vapour discharge lamp. It is claimed that the overall efficiency is now 19.4 L/W. The use of combination units with auxiliary incandescent lamps is also discussed. J. S. S.

224. Fluorescent Lamps.

S. G. Hibben. El. Journal, Vol. XXXV., No. 7, p. 269, July, 1938.

Describes the cold cathode fluorescent tubular lamp. The principles of fluorescence are described, and the operation of the lamps explained. Relative efficiencies for a given colour of tungsten (filtered) and fluorescent discharge lamps are given. R. G. H.

225. Low-Voltage Fluorescent Lamps.

G. E. Inman and R. N. Thayer. Elect. Engineering, 57, p. 245, June, 1938.

The general characteristics of the low-voltage tubular fluorescent lamps are described. The design of the lamp and its electrical and luminous characteristics are given. S. S. B.

226. Mazda Fluorescent Lamps.

A. B. Oday. Magazine of Light, VII., No. 5, pp. 9-12, Summer, 1938.

Details with photographs are given of fluorescent tubular lamps now available in America. C. A. M.

227. High Voltage Gaseous and Fluorescent Tubes for Advertising and Architectural Lighting.

J. A. McDermott. Elect. Engineering, 57, p. 286, July, 1938.

A full description and photographs are given of the application of high voltage gaseous discharge tubes, with and without fluorescent coatings. Some technical details are given; and special reference is made to future uses, as exemplified by the plans for the New York World Fair. S. S. B.

228. Development and Use of Gaseous Conductor Tubes.

J. B. McMath. Am. Illum. Eng. Soc. Trans., 7, pp. 619-631, July, 1938.

This paper deals with the gases used in and the electrical characteristics of high voltage cold cathode gaseous discharge tubes. J. S. S.

IV.—LIGHTING EQUIPMENT.

229. Reflectors Promote Highway Safety.

R. H. Hoppermann. Frank. Inst., J., 226, p. 34, July, 1938.

A brief description is given of a novel method of improving highway visibility which has been adopted on a long stretch of a main highway in America. Reflectors made of a transparent plastic are used, and are arranged to reflect the light from the headlights of the car in such a way as to illuminate the roadway. Better visibility and a greater freedom from glare from other sources are claimed for this system. S. S. B.

230. New Street Lighting Lanterns.

Anon. Elect., 121, p. 136, July 29, 1938.

Particulars, with photographs, are given of two new street lighting lanterns now available. One uses a diffusing globe in conjunction with a refractor. The other uses horizontal burning mercury electric discharge lamps with aluminium reflectors. C. A. M.

231. Painted Windows Aid Light Distribution.

Anon. El. World, 109, p. 1,892, June 4, 1938.

In the lighting of some banking offices, trials were made comparing the intensity and uniformity of illumination in rooms in which the windows were painted to match the walls with that in rooms with windows facing on a central court. On dull days the intensity near the windows was much higher when these were painted, and the uniformity of illumination was much better in the rooms with the painted windows. S. S. B.

232. Thyration Reactor Lighting Control.

E. D. Schneider. Elect. Engineering, 57, p. 328, June, 1938.

The paper gives a full description of some of the recently introduced methods of lighting control and the equipment based on the use of electronic valves and saturable chokes to obtain greater efficiency and more flexible control. Several systems are considered; and a basis for the scale of intensity for the control units is worked out. S. S. B.

233. Polaroid.

F. B. Lee. Magazine of Light, VII., No. 5, pp. 32-33, Summer, 1938.

A brief description, with photographs, is given of a polarising medium now generally available. C. A. M.

234. Discharge Lamp Control Gear.

Ir. A. de Bruin. *El. Rev.*, Vol. CXXIII, No. 3,167, p. 184, August 5, 1938.

Explains the function of the series controlling impedance in a discharge lamp circuit, and shows why an inductance (choke) gives the shortest dark period between each cycle, and therefore less flicker. The choke design is important, in view of the fact that the light output of the lamp depends largely upon the current in the lamp. Hence current fluctuations must be reduced to a minimum.

R. G. H.

V.—APPLICATIONS OF LIGHT.**235. Light and Architecture.**

Anon. *Am. Illum. Eng. Soc. Trans.*, 7, p. 615, July, 1938.

Some representative architectural lighting schemes are described with photographs.

J. S. S.

236. Visibility of Various Reading Tasks Under Combinations of Diffused and Unidirectional Lighting.

L. H. Brown, L. G. Gianini, and T. A. Robinson. *Am. Illum. Eng. Soc. Trans.*, 7, pp. 632-642, July, 1938.

Tests on the visibility of different types on various papers indicate that appreciably less illumination is needed for the same visibility with direct than with indirect lighting. These results are claimed only when the directional lighting units are placed in the optimum position.

J. S. S.

237. Lighting Facilitates Printing Operations.

Anon. *El. World*, 109, p. 1,888, June 4, 1938.

The lighting in a printing works is described. The units, which are mounted relatively low and at close spacing, are somewhat unusual in that they are of the dispersive type, but employ bowl silvered lamps. Good results are claimed.

S. S. B.

238. Library Lighting.

Anon. *Magazine of Light*, Vol. VII., No. 5, p. 29, Summer, 1938.

The fixtures used in the lighting equipment at Langden Hall, Harvard Law School, each employ two light sources, a 1,000-watt lamp encircled by a 300-watt mercury vapour tube. A photograph is given.

C. A. M.

239. Lighting of the Detroit Edison Company Building.

H. A. Cook. *Magazine of Light*, Vol. VII., No. 5, pp. 4-8, Summer, 1938.

Details are given of the manner in which both natural and artificial lighting is employed in the new service building of the Detroit Edison Co. Glass block walls are used extensively, and the indirect artificial lighting equipment is built into the ducts of the air conditioning system.

C. A. M.

240. Southern Electrification.

Anon. *El. Times*, 94, p. 5, July 7, 1938.

A photograph and short description are given of the type of lighting used in the buffet cars on the new Southern Railway electric trains. Special traction type architectural lamps are used and an illumination of 10 f.-c. is claimed.

W. R. S.

241. A Night-time Landmark.

Anon. *Magazine of Light*, Vol. VII., No. 5, p. 28, Summer, 1938.

One hundred and thirty-two kW. are used in the flood-lighting of the tower in the library extension at the University of Texas. Details with a photograph are given.

C. A. M.

242. Louisiana State University Sports Arena.

Anon. *Magazine of Light*, Vol. VII., No. 5, p. 26, Summer, 1938.

Details with a photograph are given of the lighting equipment of an enclosed sports arena at Louisiana State University. Lighting is provided from the top of the building from 141 louvred floodlight projectors at 6½ ft. spacing.

C. A. M.

243. The Mauretania.

Anon. *Elect.*, 121, p. 140, July 29, 1938.

Details are given of floodlight projectors used on the new Mauretania, that have been specially designed for marine use.

C. A. M.

244. Garden Lighting.

"Pharos." *Elect.*, 121, p. 89, July 22, 1938.

A discussion with a photograph are given of the possibilities of public and private garden lighting.

C. A. M.

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Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 485,373. "Improvements in Inorganic Luminescent Materials."

Servigne, M. Dated November 18, 1936.

According to this specification crystals of tricalcium orthophosphate or calcium borate are mixed with a normally unstable luminescent substance and the crystals are sufficiently large to render the mixture stable. Various mixtures, such as calcium tungstate, sodium tungstate, and tricalcium orthophosphate, or calcium molybdate, lead molybdate lithium oxide, and tricalcium orthophosphate are suggested.

No. 485,875. "Improvements in or Relating to Mercury Low-Pressure Luminous Electric Discharge Devices."

The General Electric Company, Limited. (Communicated by Patent-Treuhand-Gesellschaft für Elektrische Glühlampen m.b.H.). Dated December 2, 1936, October 21, 1937. (Cognate Applications.)

Luminescent material comprises, according to this specification, calcium lead tungstate forming a solid solution containing substantially 96 per cent. to 93 per cent. by weight of calcium tungstate and 4 per cent. to 7 per cent. by weight of tungstate. It may be used within the envelope of a low-pressure mercury vapour lamp.

No. 485,877. "Improvements Relating to High-Pressure Metal Vapour Electric Discharge Lamps."

Siemens Electric Lamps and Supplies, Limited, and Aldington, J. N. Dated December 8, 1936.

According to this specification a cylinder of highly refractory material surrounds wholly or nearly wholly one electrode and at least part of the discharge path of a metal vapour lamp and is heated by the arc discharge to incandescence, thus contributing to the light of the lamp. The refractory material may be such as zirconia or alumina.

No. 486,394. "High-Pressure Metallic Vapour Electric Discharge Lamp."

Vereinigte Glühlampen Und Elektrizitäts Aktiengesellschaft. Dated October 26, 1936. (Convention, Germany.)

According to this specification a high-pressure vapour discharge lamp has a bulb the maximum internal dimension of which is less than 20 mm. and the smallest dimension is greater than the distance between the electrodes. For example, a 10-watt lamp, emitting 35 to 40 lumens per watt, has a spherical discharge chamber of about 5 mm. to 6 mm. in diameter.

No. 486,418. "Improvements in Means for Producing Light Comprising in Combination an Electric Discharge Lamp and an Electric Incandescent Lamp whose Filament is in Series with the Discharge Path."

The British Thomson-Houston Company, Limited, and The General Electric Company, Limited. Dated February 20, 1937. (Convention, Germany.)

A filament in series with the discharge path of a discharge lamp is, according to this specification, enclosed in an elongated bulb itself enclosed within

the envelope of the discharge tube. One lead passes through the discharge tube envelope into the elongated bulb and is connected to the filament. The other end of the filament has a lead passing through the elongated bulb and connected to one electrode of the discharge tube.

No. 486,844. "Improvements in or Relating to Paraffin Incandescent Burners."

Ehrich and Graetz Aktiengesellschaft. Dated February 6, 1937. (Convention, Germany.)

This specification comprises a paraffin incandescent burner in which a wick is carried between an outer and an inner wick tube. Two concentric burner cones are provided, the outer surrounding and covering the inner and spaced therefrom. An air diverting flange is provided inside and spaced from the inner cone and from the outer wick tube. The cones are apertured and serve to distribute air to the burner.

No. 487,011. "Improvements in or Relating to Reflecting Electric Incandescent Lamps."

Birdseye Electric Corporation. Dated September 11, 1936. (Convention, U.S.A.)

This specification describes an electric lamp in which the bulb is shaped and coated to present a reflecting surface formed by revolving a parabola about the axis of a mount at a constant distance therefrom so that the focus of the parabola describes a circle. The filament is located in or near the circle. Behind the plane of the focus the reflecting surface is globular and of different curvature.

No. 487,019. "Improvements in and Relating to Electric Discharge Devices."

The British Thomson-Houston Company, Limited. Dated October 20, 1936. (Convention, Germany.)

The bulb or container of a discharge device is, according to this specification, internally coated with a fused glaze of boron phosphate and adherent finely divided luminescent material.

No. 487,520. "Improvements in Combinations of Gas-Filled Electric Discharge Devices and Materials Adapted to be Excited to Luminescence by Them."

The General Electric Company, Limited. (Communicated by Patent-Treuhand-Gesellschaft für Elektrische Glühlampen m.b.H.). Dated February 19, 1937.

According to this specification the luminescent material of a gas-filled discharge device is a ceramic material resulting from sintering a mixture in which magnesium oxide and titanium oxide constitute at least 90 per cent. to which beryllia may be added.

No. 487,624. "Improvements in and Relating to Fluorescent Material and Methods of Manufacturing the Same."

The British Thomson-Houston Company, Limited. Dated April 22, 1936. (Convention, U.S.A.)

This specification describes a fluorescent material comprising cadmium oxide, silica, and an activator in which the amount of cadmium oxide is less than that required by the chemical formula CdSiO_3 .

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Discussions at meetings of the Decorative Lighting Section of the Illuminating Engineering Society have revealed a certain amount of uncertainty in regard to the meaning of "decorative lighting." It has even been contended that no such thing exists! It will, however, be admitted that lighting fittings, besides their primary function of illuminating an interior, may often serve themselves as decorative objects, and that the part they play in revealing decorations may itself justify the title "decorative lighting."

The accompanying views of the Kardomah Cafés in Manchester, Birmingham, and Cardiff, designed by Misha Black and Walter Landauer, of Industrial Design Partnership, have been selected for their interest in showing—in several distinct ways—how utilitarian and decorative aims may be combined in lighting installations. They also illustrate very well how conditions quite distinct from those of a purely technical character arising from the special purpose served by an interior, often go far towards determining the nature of the lighting.

In Fig. 1 we have an example of concealed lighting, often preferred as providing the right atmosphere for an interior of this kind, the monotony of which is relieved by the gunmetal mirror discs on the walls. The metal is cut away where the design occurs, and the discs are backed by flashed opal glass illuminated from behind. These discs are essentially "decorative" objects. At the same time they do, as suggested, play an essential part in the lighting by providing local sparkle to counteract any impression of flatness associated with the absence of visible light-sources. Another interesting feature in this installation is the rear screen of glass bricks, which



Fig. 1. Interior view of Kardomah Café, Manchester, showing rear screen of glass bricks, concealed lighting and decorative discs illuminated from behind.

assists access of daylight into the room besides obliterating the view of an unsightly side street.

In Fig. 2 we have again a pleasing combination of the utilitarian and the decorative elements. The specially designed pendant fittings (5 ft. in diameter) furnish both direct and indirect lighting. These fittings are made in copper-sprayed sheet steel and flashed opal glass tinted "champagne" colour. They are topped by clear glass to prevent dust assembling on the flashed opal. A feature is the "floating" impression of lightness, such as is not always easy to achieve in pieces of such large dimensions. Besides being in themselves decorative objects which "catch the eye" and make a certain aesthetic appeal, the fittings aid the elimination of the flatness of indirect lighting from the ceiling alone. Further local interest is, however, excited by the panel lights pro-



Fig. 2. Kardomah Café, Birmingham. Here the pendant lighting units furnish a combination of direct and indirect lighting, and serve as decorative objects as well as illuminating the room.



Fig. 3. The Kardomah Café, Cardiff. The local lights illuminating individual tables also serve to reveal the various symbolic designs which embellish the polished wooden panels above them.

ducing extra illumination at the sides of the room and by the luminous discs, similar in type to those illustrated in Fig. 1.

A near view of the carved head of the Mandarin, seen in the background of this picture, appears in Fig. 4.

In Fig. 3 we have several interesting features. In the ceiling of this long and narrow ground floor room there is a central opening 3 ft. wide, along the main axis of the interior. A first floor balustrade runs round this opening, and tables and chairs are assembled thereon. Customers on the first floor can thus look downward on the floor below. Direct lighting from the centre is rendered impossible by the openings. On the other hand any form of indirect lighting should be invisible to those above. Rows of pendant trough fittings along both sides of the opening were considered inexpedient from the architectural standpoint.

The method adopted, which has been found to meet the case very satisfactorily, is based on the use of specially designed cill lamps which create just the right atmosphere of privacy for each alcove, and give a soft effect. Besides illuminating the tables they serve to reveal the various symbols (teapot, ship, etc.), which embellish the wooden panels and play a useful part in relieving monotony of effect. The lampshades are made of transparent "Bexoid" sheeting, a fabric being pressed between two layers of the material, the usual cleaning difficulties being thus avoided.

We are indebted to Mr. H. Juliusburger for the information and photographs utilised in this article.



Fig. 4. The Mandarin, carved in mahogany, a feature of the Kardomah Café in Birmingham. A spotlight, recessed in the ceiling, serves to emphasise the sculpture by creating strong contrasts.

Personal.

Mr. T. N. Riley, D.S.C., M.Sc., M.I.E.E., has resigned his position with G.V.D. Illuminators, Ltd., and is entering into practice as a consultant. Mr. Riley was formerly Assistant Director of Research in the International Telephone and Telegraph Laboratory. All communications for the present should be sent to 22, The Avenue, Radlett, Herts.

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NOTES ON ILLUMINATING ENGINEERING ABROAD

(Specially Contributed—H. L. J.)

Germany.

In a contribution to "Das Licht" on "Lighting and Fog," M. Wolff points out that the loss in intensity undergone by a beam of light in traversing a fog is only partly due to absorption. To a much greater extent it is the effect of *reflection* or *refraction*. In consequence of this "spraying of light" the fog particles act as independent light sources and the brightness thus produced within the foggy area is superimposed on that produced by the actual light sources. Contrast is thus lessened and perception of objects in the beam is impaired. The circumstances which produce such a spraying of light vary according to the wavelength and the size of the fog particles. If the wavelength of light is greater than the radius of a particle the spray bears a definite relation to the wavelength, and in these circumstances bluish light will be sprayed more completely than red. This happens in the case of mist. In ordinary fog, however, particles of diameter 1μ to 50μ exist, thus being considerably greater than the light wavelengths. Under such circumstances no theoretical investigation has proved applicable to practical circumstances. The only prospect of a solution is by means of practical experiments, a course which has been adopted by several scientists. Some investigations are discussed. The results of those regarding the relation between wave length of light and permeability through fog closely resemble results of theoretical investigations. In the case of very thick fog bluish light penetrates slightly better, in ordinary fog no difference in penetration can be found, whilst in mist reddish light gives better penetration. Such differences in permeability are, however, very small. If, for example, in the case of mist the bluish rays present in a light source of given spectral intensity were cut out by means of filters, the benefit of increasing the contrast by diminishing the spray light, would be counter-balanced by the decrease of over-all intensity. The last way left to increase permeability, therefore, is to alter the distribution of energy within the spectrum, e.g., by using monochromatic light sources, though this has no material advantage at the present stage of development as it is not yet possible to produce equally efficient light of different colours at a given wattage. Several experiments have also been made regarding perceptibility of objects in fogs. If the colour of the surface of the test object is neglected it may be assumed that the light reflected will show an altered energy distribution shifted to the red part of the spectrum compared with that of the light source. If, therefore, the bluish part of the light is eliminated by filters and the spray light thus diminished, the contrast and thus perceptibility of the object is increased at the cost of a general loss in intensity. But here, again, there is no material advantage in using coloured filters, gain in contrast being offset by loss of light.

Switzerland.

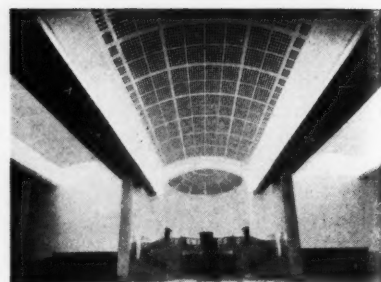
According to the Bulletin of the Institution of Electrical Engineers in Switzerland, the Swiss Association of Electrical Engineers (A.S.E.) in conjunction with the Association of Swiss Electricity Power Undertakings (U.C.S.) has set up a committee for the study of the lighting for streets and trunk roads. The committee had its inaugural meeting in Berne in December last. The chairman is Mr. A. Filliol, President of the Swiss National Section of the Inter-

national Illumination Commission. The activities of the committee cover the following:

- (a) Drafting of recommendations for lighting equipment of trunk roads.
- (b) Collection of published data relating thereto.
- (c) Preparation of tabular data based upon actual measurements in Switzerland.
- (d) Special inquiry into the selection of illuminants.
- (e) Inquiry into costs of erection and maintenance, including comparison of different types of installations.

France.

A view of the Reception Hall at Le Bourget Airport (Paris). The ceiling consists of circular glass bricks which admit natural light during the day. At night time the lighting is indirect, the ceiling being illuminated artificially by concealed sources of light.



(Ljuskultur)

Maurice Deribère, in a recent contribution to "Lux," remarks that plastics are proving very useful media for objects required to glow in the dark. Many of them show highly efficient fluorescent properties, and there are quite a number which also show phosphorescent properties. Cellulose acetate has an excellent transparency for visible and U.V. radiation. In its ordinary condition it exhibits only a feeble fluorescence, but if tinted or pigmented with rhodamin or eosin it reveals beautiful colours. Phenolic resins and moulded urea plastics are practically opaque to U.V. radiation, but these, too, may be pigmented or tinted in order to yield fluorescent effects. One familiar material is a cellulose derivative mixed with synthetic resin and pigmented with strontium sulphide, etc., and is commercially available to yield a variety of colours. There are now many translucent and fluorescing materials suitable for use on a large scale, e.g., as accessories in cinemas, theatres, and music-halls, for numbering of hotel rooms, for artificial flowers, etc. (*Lux*).

"Le Syndicat General des Installateurs Electriques" (Association of Electrical Contractors) recently arranged a second course of lighting for its members. M. Maisonneuve read a paper on "Lighting from the Commercial Point of View." He stated that even during periods of commercial crisis lighting consumption tends to increase steadily, and he indicated various promising fields of development. Another paper ("Exposé sur une question generale d'Ordre Economique") was submitted by P. C. Commanay, dealing with the question of rationalising the present distribution system of electrical goods. Contractors were advised to keep in close touch with makers, to keep abreast of technical developments. Manufacturers, likewise, should keep in touch with each other and with the contractor, with a view to concentration of forces in the same direction. Thus a more economic and beneficial service to the public would be assured. A third paper "The Technical Development of Electric Light Sources," by E. Gomonet, reviewed the historical development of sources of light.

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Public Lighting with Gas

Under a new contract, Pembroke Dock is to be lighted with gas until 1947; about 277 lamps are covered by the contract.

The Slough Urban District Council has accepted a five-year contract covering 824 lamps. Two and four-mantle lamps, some now fitted with special reflectors, are in use.

At Southwold, where a five-year contract has been adopted, the Council has decided to light all the year round instead of the ten-months' period. Five-light lamps have been fitted at the island junction in the main street and four-light clusters will shortly be fitted on lamps in the principal main streets and the Parade.

The Renfrewshire County Council has renewed its gas-lighting contracts for Linwood, Elderslie, Potterhill, and Cardonald, covering about 258 lamps.

During the year ended March 31 last the consumption of gas for public lighting in Stoke-upon-Trent showed an increase of 28 per cent., and the total number of public lamps in use rose to 6,032.

Leatherhead Urban District Council has adopted a ten-year agreement for the lighting of the Ashted and Bookham wards by gas. Considerable improvements will be made in the lighting, which involves 458 lamps. The candle-power and mounting height of 333 lamps will be increased. Reflectors are fitted to all lamps.

Over 3,000 gas lamps are used for the lighting of secondary roads in Poole, and the Borough Council has made these the subject of a new five-year contract, under which the standard of lighting will be improved. The Bournemouth Corporation

have also entered into a five-year agreement for improved lighting of secondary roads. The smaller lamps among the 5,800 gas lamps in use are to be gradually replaced by suspension lamps with refractors.

There are now 25,907 gas lamps used for public lighting in Edinburgh, according to the annual report of the Corporation Gas Department. This represents an increase of 3,065 on the total for 1936-37. Since 1931 the number of lamps has been more than doubled. The consumption of gas during the year for public lighting was 188,592,467 cubic feet.

Middlesbrough Corporation Gas Department has in hand the modernisation of the lighting on the portion of the Redcar Trunk Road that lies within the borough, and the new lighting should be in operation shortly. On nearly one and three-quarter miles of this main road, sixty-three ten-light gas lamps are being installed in staggered formation at an average spacing distance of 42 yards between lamps. The lamps are on bracket arms projecting 4 ft. 9 in. over the roadway at a height of 25 ft.

The Wandsworth and District Gas Company has recently entered into a contract with the Wandsworth Borough Council for the supply of gas to, and maintenance of, a large number of traffic signs and bollards. The number of these modern gas-lighted units in commission in that part of the Wandsworth Borough Council area served by the company already exceeds sixty. In the adjoining Mitcham Borough over seventy gas-lighted traffic signs are already in use.

Recent contracts for gas lighting in the streets of the areas they administer have been made by the authorities at Bonness (West Lothian), Southborough (Kent—a five-year agreement specifying various improvements), Thrapston (Northants), St. Asaph (Flintshire), Galston (Ayrshire), Warrenpoint (Co. Down), Finedon (Northants—a three-year contract), Heckington (Lincs), Llanidloes (Montgomery), Alcester, Charing (Kent), Hellfield (Yorks), Malton (Yorks), and Kirbymoorside (Yorks—a five-year contract), Rayleigh (a five-year contract), Rugeley (a three-year contract).

Textile Lighting and Colour Discrimination

In a paper recently read before the West Riding section of the Society of Dyers and Colourists Mr. J. W. Howell discussed problems involved in textile lighting.*

After emphasising the close relation between conditions of illumination and the power of perception of the eye Mr. Howell quoted statistics relating to jute and silk weaving, knitting, etc., showing how increases in illumination had led to increases in production of from 11 to 20 per cent. He also reproduced the familiar diagram showing how full efficiency in typesetting requires illumination of the order of 20 foot-candles. In the textile and allied industries illuminations of 3–5 foot-candles are common—though in dyehouses, Mr. Howell remarked, it is often scarcely possible to get a photometric reading owing to the bad lighting and the presence of steam. Other common faults, such as glare and harsh shadows, were also discussed.

Industrial installations may be divided, roughly, into: (1) general overhead, (2) localised overhead, (3) combined general and local, and (4) specialised lighting. Any local system should be regarded as supplementary to general lighting in order that no regions of the room were left in obscurity. Dyehouses are notoriously difficult to light properly owing to steam and acid vapours present. The bulk of the plant could be illuminated by a general system giving not less than 5 foot-candles; in addition, local vapour-proof bulkhead fittings should be mounted inside the vessel hoods.

After discussing the various forms of reflectors available Mr. Howell passed on to the important question of maintenance, recommending that lamps and fittings should, in general, be systematically cleaned at intervals of 4–6 weeks; whilst in steamy and vaporous atmosphere the period should be shortened to 7–10 days. Figures were quoted showing improvements in illumination varying from 25 to 150 per cent., achieved in foundries and steelworks merely by cleaning lighting equipment.

The next section of the paper consisted of a review of the development of electric lamps and electric discharge lamps in particular.

In his concluding remarks Mr. Howell reviewed existing methods of correcting colour values, including: (1) daylight blue electric lamps, (2) lamps with glass-correcting filters, (3) combinations of filament and discharge lamps, (4) discharge lamps with other gases introduced for colour correction, (5) discharge lamps corrected by means of fluorescent powders, and (6) the carbon dioxide tubes. (1) is satisfactory where only partial correction is needed, (2) makes possible high accuracy but at the cost of considerable loss of light. More efficient is the use of luminescent powders converting visible ultra-violet energy into a visible form, but there are limits to the degree of correction thus possible. The carbon dioxide tube (6) remains remarkably constant and is capable of giving a reproduction of north sky conditions even preferable to daylight.

In the discussion the important consideration was raised whether coloured materials might be examined by users under conditions differing from those prevailing when they were passed after inspection in the factory. The lecturer agreed that the question was an important one and there was a great need for standardised inspection equipment.

* "Journal of the Society of Dyers and Colourists," vol. 54, July, 1938, p. 293.

Special Lighting in The Guildhall



On the occasion of the British Standards Institution banquet at the Guildhall special lighting, intended to illuminate the roof of the hall, was devised by the lighting engineers of the B.T.H., Ediswan, G.E.C., and Siemens companies, who collaborated at the request of Mr. Percy Good, secretary of the institution. The lighting was a somewhat difficult problem owing to the dark nature of the interior surfaces. Fourteen 1,000-w. floodlights of the horizontal type were accommodated in the side window and galleries. The results were considered very successful, many features of the roof and decorations in the upper regions of this fine interior being effectively "brought to light" for the first time.

Gas Lighting on the Liverpool-Preston Main Road

The accompanying illustration shows a view of the Liverpool-Preston main road at Burscough Bridge, which is now lighted by 8-light "Maxill" gas



lamps, under one of the recent 15-year contracts entered into by the Ormskirk U.D.C. A feature is the wide distribution of brightness over the entire road-surface.

*The lantern that leads the way
to improved Street Lighting-*

B T H
MERCRA 'H'
L A N T E R N

(Patent Nos. 429,750, 435,310, 463,692, 465,481)

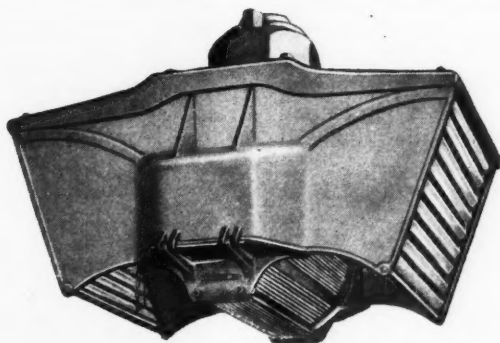
**HORIZONTAL LIGHTING WITH MERCURY DISCHARGE LAMPS
WAS ORIGINATED BY THE BTH COMPANY IN 1934.**

A patented magnetic deflector is incorporated in the Mercra "H" Lantern, and this enables a standard 400 watt or 250 watt Mercra Lamp to be burned in a horizontal position, thus giving all the advantages of improved light distribution and control without sacrifice of efficiency.

Recent Mercra "H" installations in various parts of the country have received the highest commendation from lighting engineers. The installations conform entirely with M.O.T. Regulations and represent the peak of street lighting technique.

BTH Lighting Engineers will be pleased to advise, without obligation, on any contemplated Street Lighting Scheme.

A.P.L.E. CONFERENCE—BOURNEMOUTH, Sept. 5th to 8th.
Make a point of visiting the BTH Stand—Nos. 23 and 24—where interesting demonstrations of the MERCRA "H" Lantern are being shown.



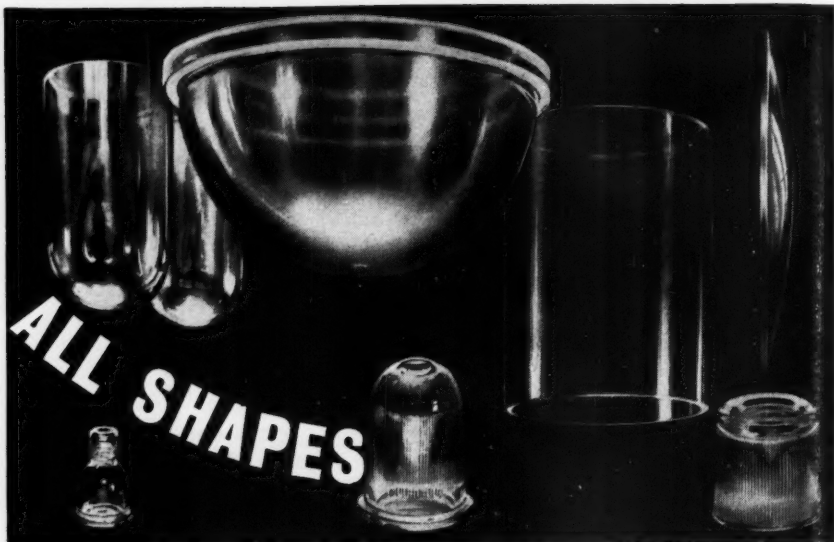
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ALL SHAPES

After "Armourplate" — "Armourlight"! This is blown or moulded glass toughened by a similar process. It may be 5, 10 or even 20 times as strong as ordinary glass against impact, according to shape and substance. Its resistance to temperature change is greatly increased. Floodlight Glasses, Well Glasses, Insulators, Convexes—there is no end to its uses for lighting and electrical apparatus. What can we make for you in "Armourlight"? Let our technical experts discuss your ideas. Write to PILKINGTON BROTHERS LIMITED, ST. HELENS, LANCs.

'ARMOURLIGHT' GLASS

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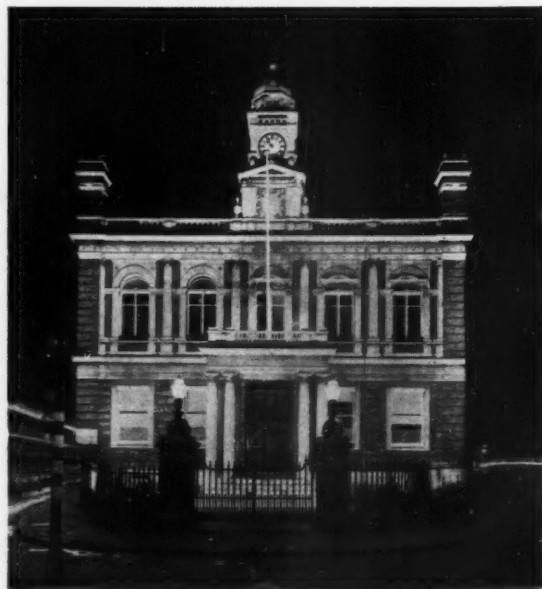
A Modern Marvel

An illustrated booklet bearing this title contains a contribution by Col. The Hon. Arthur Murray, C.M.G., D.S.O., Chairman of Radiovisor Parent, Ltd., in which the manifold applications of light-control are described. As readers of this journal are aware there are many applications of light-sensitive cells besides the automatic control of street lamps. The book mentions over fifty of them ranging alphabetically from bollards and burgling alarms to visibility apparatus and welding plant. Two effective illustrations show the guarding of the Crown Jewels of the Shah of Persia (at the Persian Art Exhibition, 1931) and the sleepwalker protection apparatus—the latter a device that we do not recall hearing of before.

Coloured Floodlighting

A new and interesting colour floodlighting installation has recently been completed for the new premises of the County of London Electric Supply Company, at East Wandsworth, formerly the offices of the Wandsworth Borough Council. The building occupies a commanding site. A scheme of floodlighting by sodium and mercury discharge lamps has been adopted, the former being used for the building as a whole, and the mercury lamps in special Holophane floodlights for the clock tower. Additional contrast was furnished by two ornamental refractors

furnished with gas-filled (filament) lamps on each side of the gateway. The interior of the building is lighted with the new Holophane "Step-o-lite" fittings.



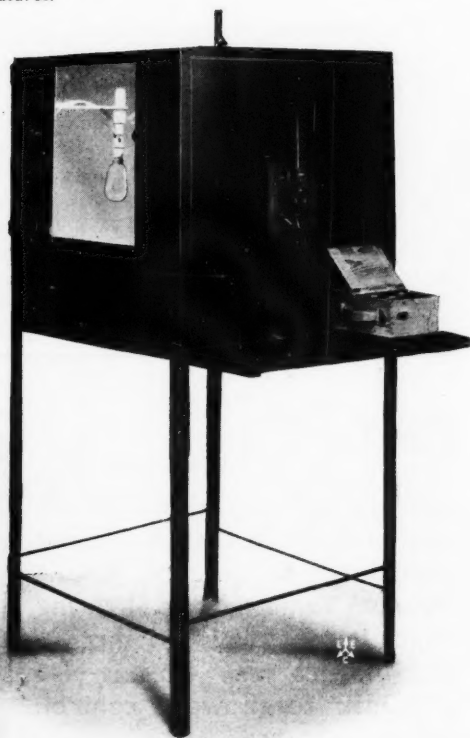
A general view of the new Central Offices of the County of London Electric Supply Company, at Wandsworth, with Holophane colour floodlighting.



● **VEST POCKET LIGHTMETER.** Notwithstanding its small size the Vest Pocket Lightmeter has the characteristics of the larger "Autophotic" Portable Photometers. The scale is specially designed to utilise to the best advantage the extreme handiness and portability of the meter.

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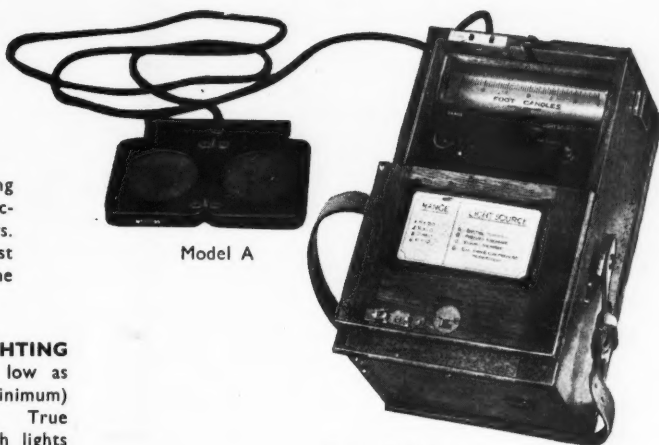
● **HOLOPHANE - EDGCUMBE STREET LIGHTING PHOTOMETER.**—Measurement of illumination as low as 0.005 foot-candle (which is half the recognised minimum) is now possible with this remarkable instrument. True indications at large angles of incidence, accuracy with lights differing widely in colour, and complete portability are other features.



Autophotic Cube Photometer

PHOTOMETERS OF ALL TYPES

EVERETT EDGCUMBE make a complete range of **PHOTOMETERS** employing the well-known **AUTO-PHOTIC CELL** for every kind of light measurement.



Model A

Street Lighting
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● **CUBE PHOTOMETERS** for lamp testing in bulk with ease and rapidity. Essential to lamp manufacturers, factors, Illuminating Engineers, and users of lamps in large quantities. An unique compensating device for obscuration enables the efficiency of complete fittings to be tested.

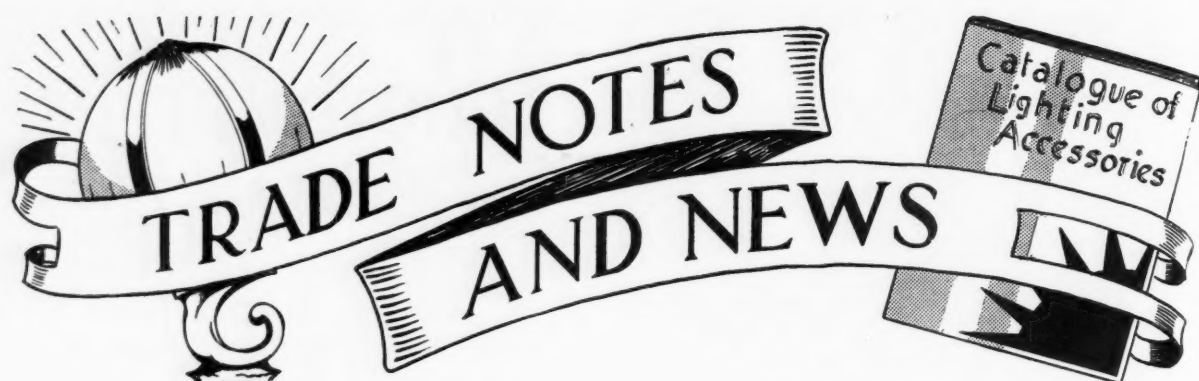
● **POLAR CO-ORDINATE OR DIRECTIONAL PHOTOMETERS** for measuring distribution of luminous flux of lamps and the efficiency of lanterns and fittings.

Write for Catalogue

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Manufacturers of all kinds of indicating and recording electrical instruments and photometry experts.

**COLINDALE WORKS
LONDON, N.W.9**



Holophane Developments for 1938

For the coming season Holophane, Ltd., have completed their range of "Built-In" fittings, architectural lighting fittings, to which we have previously made reference. A recently issued catalogue shows a great variety of types. We understand that the concentrating flush ceiling units have proved particularly popular and effective. There is no doubt that this mode of lighting will continue to play an important part in the immediate future, in view of the possibility of securing a completely free view from end to end of a large room—a great advantage in all cases where displays of any kind are being organised.

New Methods of Glass Construction

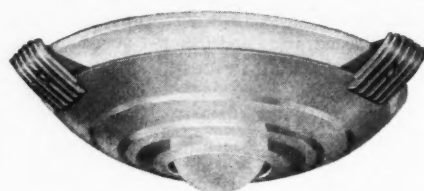
At the Building Exhibition, taking place at Olympia during September 16 to October 1, 1938, Messrs. Pilkington Bros., Ltd., have a very representative display assembled on three stands devoted respectively to General Glass, "Armoured" Glass and Double Glazing. One feature illustrated at the General Glass Stand is the possibility, owing to new methods of construction, of dispensing with metal or wood frames to protect the edges of the glass. New methods of construction enable glass to play a more structural part in buildings than before. Features include a staircase with armourplate glass treads, glass balustrade and handrail; an upper galley floor formed of pre-cast slabs of glass lenses; Vitrolite, silvered glass and other types of glass floor tiles and numerous colour schemes and new decorative effects in which glass plays an essential part. At the armoured glass stand the results of this process whereby moulded and blown glass can be toughened, so as to resist exceptional pressure impact and thermal shock, will be fully shown, whilst at the double glazing stand the values of this process for sound insulation will be illustrated.

Southend's "Never Never Land"

One of the most recent and effective applications of fluorescent effects is to be found in Southend's "Never Never Land." Here magic castles, elves and other objects of fairyland, coated with fluorescent powders, shine out by the light of Philips black bulb lamps, introduced by Mr. A. C. Johnson, the Borough Electrical Engineer.

A Pleasing Dish Fitting

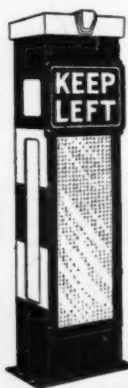
The pleasing pattern of a dish fitting, here illustrated, has been developed by the General Electric Co., Ltd., for use



in the Glasgow Corporation Buses. The fitting gives a soft light and its compact nature is an evident advantage where headroom is limited.

Crompton Parkinson Diamond Jubilee

We have been favoured with a copy of the Souvenir Programme of the Crompton Parkinson Diamond Jubilee Fête, which took place in Chelmsford on July 9. A survey of progress during the past sixty years includes reference to the wonderful record of Colonel R. E. Crompton, born in 1845. There is also a remarkable table of periods of service of some hundreds of members of the staff, over fifty of whom have been with the firm for more than forty years.



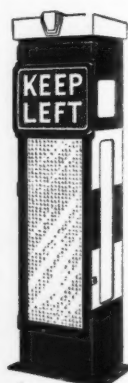
Please Read This

It is now established that there is an obligation upon all Local Authorities to keep their Bollards and Street Refuges lighted so long as it is dark, and this obligation is a continuing one if the Bollard or Refuge is a danger on account of darkness.

Specify the "Radiovisor" Mark V A.C. Unit for the control of the illumination of Street Refuges and Bollards.

Now This

The "Radiovisor" Mark V A.C. Lighting Control Unit has its circuit so designed that should any component of the unit circuit become damaged the lighting which it controls is switched on and remains on. This is also a "Dusk to Dawn" control.



RADIOVISOR PARENT LIMITED, 28 LITTLE RUSSELL STREET, LONDON, W.C.1

GOOD LIGHTING

WHAT is meant by "good lighting"? Does it not mean lighting which approximates as closely as possible to the best natural lighting? On a lightly overcast day, with absence of glare and practically no shadow, we can see equally well wherever we may be, outside or indoors, and in any part of the room. Surely these are the conditions under which our eyes were intended to function, and which we must have in order to preserve our sight, that wonderful mechanism which is, perhaps, the most precious gift we possess.

If we were rich, but lost our sight, would we not willingly give up a fortune to recover it? Then let us at least be prepared to spend a few pounds and give a little thought to the preservation of it.

One of the chief causes of eyestrain is glare. When we are surrounded by numerous visible lamps, which shine in our eyes wherever we turn, we soon begin to suffer, consciously or unconsciously, from the strain. Black shadows also cause strain and confusion, especially where there is much movement.

Any lighting which is patchy or uneven puts a strain on the iris, which is constantly opening and shutting in the effort to adjust itself to the varying intensities.

Hence the important thing in good lighting is not the intensity, or size and number of lamps, but even distribution and diffusion of the light.

Mr. G. V. Downer, a well-known lighting consultant, has made a special study of this problem and has evolved the G.V.D. System which has already been adopted by H.M. Office of Works, the War Office, London County Council, R.M.S. "Queen Mary," Claridges, and innumerable offices, factories, hospitals, schools, nurseries, gymnasia, churches, hotels, clubs, railways, cinemas, flats and other residential buildings in all parts of the world.

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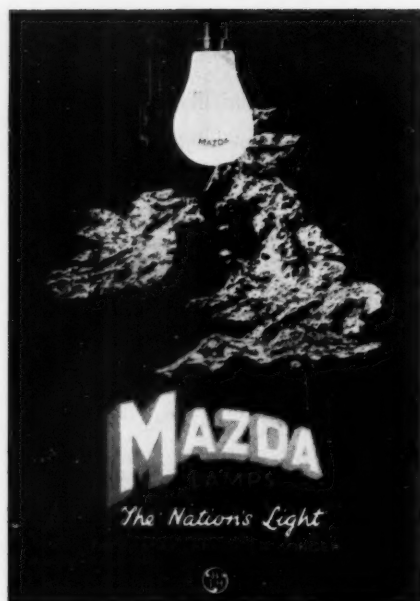
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*Did you
see it?*

*This announcement has appeared
in the principal National News-
papers.*

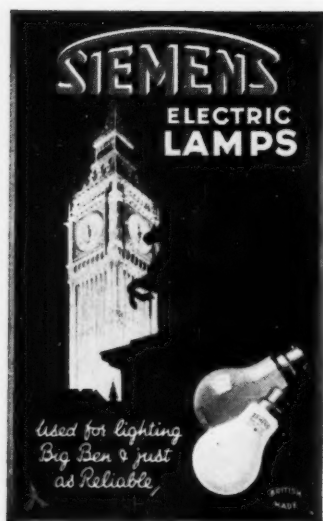
*It is believed that readers of this
journal may be interested to see
what is being done to help to
stimulate interest in Good Lighting.*



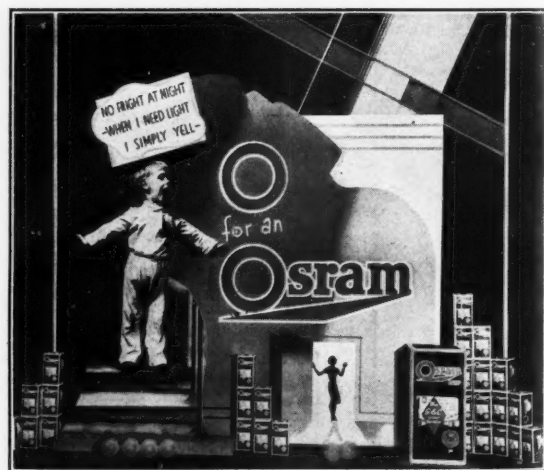
Right—A good design embodying the central slogan on which the Crompton Parkinson new campaign is based.



Left—An attractive new Mazda poster ("The Nation's Light"), which will play an important part in the B.T.H. autumn publicity.



Right—"No Fright at Night." An Osram illuminated window display, in two sizes, and in a colour scheme of blue, white, red and yellow.



Left—This Siemens window display embodies the familiar "Big Ben" feature, and shows the clock tower of the Houses of Parliament floodlighted.

Autumn Lamp Publicity

We give above specimens of some of the showcards and window displays from leading makers of electric lamps recently received. No doubt there are more to follow. It is interesting to observe the new features—for example, the Crompton Parkinson slogan which replaces the "hat" theme and the various devices which supplement the "Osram—the Wonderful Lamp" showcard of the G.E.C. In most cases additional literature dealing with special forms of lamps, e.g., for motor-car headlights or of the tubular "architectural" variety, is also available.

Other data that has so far reached us includes the Philips poster, with a child's face in the bowl of the lamp ("Use Philips' Lamps and See"), the Edison literature, with a girl's face in the bulb ("Better Sight through Better Light"), and that of the Metro-Vickers Electrical Co., Ltd., relating to Cosmos lamps ("Used by Men of Vision").

The scheme of the leading companies is evidently a comprehensive one, including new catalogues, posters, and showcards, and advertising in the Press. Yet another aid to publicity—a film campaign—is being utilised by Philips Lamps, Ltd.

Benjamin Literature

A novel note is struck in the series of four-page leaflets issued by Benjamin Electric, Ltd., each stressing the need for good lighting, but dealing with some special aspect, and each bearing a front cover illustration which arrests attention. Such headings as "New Wine and Old Bottles . . .", "The Point is . . .", "Hands Cannot Work Without . . .", "Small Beginnings . . .", "The Young Idea . . .", and "The Best Things in Life . . ." are all illustrated by amusing full page pictures. Inside "Benjamin Planned Lighting" in various fields of work is featured and accompanied by pithy advice. In general the contents of the inside pages are adapted to the title, e.g., "Hands Cannot Work Without . . ." naturally leads to a reference to industrial lighting, whilst "The Young Idea . . ." is associated with school lighting. On the back pages details of lighting equipment appear. One might single out for mention two front page illustrations which struck us as specially effective—"Truth is Not Naked . . ." with a picture of an umpire delivering his verdict and as usual very fully decorated with the caps and sweaters of the cricket team, and "Life Begins at Dusk . . ." with the cat cautiously crossing the threshold.

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Unbreakable
GAS GLOBES
should be used for
SAFETY

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● Cannot break. Save mantles.
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PRECISION **LOW PRICE**



DIRECT DRIVE AND RATIO PATTERNS

Will not run back. No wheels to get caught in. Sizes to 10 cwt. smallest wall space, side or front driving, also special types including multi-division barrels, combined horizontal and vertical operation.

The Illuminating Engineering Society (U.S.A.)

Notes on the Current Transactions
July, 1938

NEWS: *The President-elect of the Society is Mr. D. W. Atwater, Westinghouse Lamp Division, Bloomfield, N.J.* The new streamlined express put into operation on June 15 carries an *illuminated* emblem display on the rear car. This is the first application to transport of the recently-introduced fluorescent discharge lamps. The a.c. current is provided by small rotary converters, four 15-watt blue lamps are used to flood a curved background to the actual sign, giving a silhouette effect. A lamp design contest is being organised by the Electrical Testing Laboratories in conjunction with the I.E.S., the American Institute of Architects and Institute of Decorators. The winning designs will be awarded a "blue ribbon" and will become the property of Electrical Testing Laboratories. The product will be released to certified manufacturers of I.E.S. Specification.

SUBJECT OF PAPERS: "*Development and Use of Gaseous Conductor Tubes*," by J. B. McMath. A survey is given of the historical development and the present status of high-tension discharge tubes. Attention is drawn to the rarity of the gases used. The colours available have increased greatly since the recent introduction of fluorescent powders, sixteen of which are enumerated. The article closes with a valuable table giving the relations between

height of lettering and distances of visibility for luminous tube fascia signs.

"*The Visibility of Various Reading Tasks under Combinations of Diffused and Unidirectional Lighting*," by L. H. Brown, L. G. Gianini, and T. A. Robinson. Comfortable illumination seems to have a definite limit when the eye is subjected to the same illumination as that devoted to the object examined. This difficulty so far has been overcome by providing local lights such as reading lamps, etc. But general illumination on the working plane by means of unilateral light has, up to the present, been provided only in natural lighting. In these experiments an indirect working light-source gives even illumination all over the working plane, but its effect is supplemented by other light-sources giving light mainly in one direction and so arranged that the angle of incidence approximates to that of natural daylight. Tests were conducted with varied types of lettering, reflection values of different paper and alteration of illumination. The results of experiments showed, within certain limits, improved comfort arising from the application of the unidirectional principle and seemed to justify further experiment.

"*Improvements in the Low-Pressure Mercury Vapour Lamp*," by R. C. Kelting and L. J. Buttolph. The development of this type of discharge lamp is discussed, valuable data on up-to-date methods of construction are furnished, and comparisons with the first Cooper-Hewitt type are made. A new combination lamp using incandescent lamps in conjunction with these tubes is described. The authors recommend two lumens of incandescent (filament) light to one lumen of mercury light, which gives a somewhat warmer light than is usual with combinations of high-pressure lamps intended to simulate daylight.

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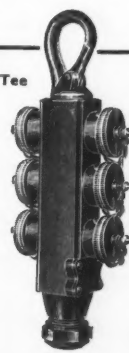
Wide though it is, the range of standard Niphan cable couplings and plugs does not always include a fitting suitable for a special job. If, on reference to our illustrated catalogue, you do not find what you want, forward your specification to us. We will gladly design specially for you.



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6-Way Tee



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Payment for an advertisement in this section entitles the advertiser to receive *Light and Lighting* during the period of the contract.

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Take no risks—specify **BENJAMIN PLANNED LIGHTING**
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for all requirements
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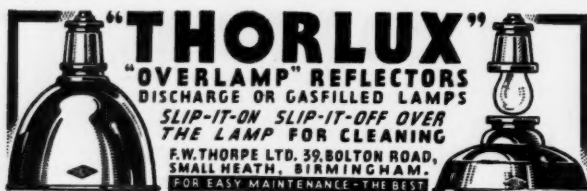
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PRISMALUX DIRECTIONAL UNITS.

**We invite Enquiries from Readers or
Particulars of "Wants" such as
might be satisfied by Advertisers in
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N.B.—The numbers are those attached to individual entries in the Directory (See pp. 226-228).

Catalogues and Advertising Literature

BENJAMIN ELECTRIC, LTD.—Catalogue of "Ali-Tal" aluminium reflectors; also numerous illustrated leaflets dealing with Bencolite units, industrial and office lighting, etc.

BRITISH THOMSON-HOUSTON COMPANY, LTD.—Illustrated catalogues dealing with the Mazda Lamp, Mazda Car Lamps, etc., also Industrial (Mazdalux) Lighting Fittings.

CROMPTON PARKINSON, LTD.—Illustrated booklet dealing with the manufacture of cables at the firm's works at Derby. A very effective picture of floodlighting appears on front cover.

GENERAL ELECTRIC COMPANY, LTD.—Osram G.E.C. Bulletin (August, 1938), contains a number of illustrated notes on the lighting of factories, offices, swimming baths, etc.

HOLOPHANE, LTD.—Illustrated catalogue of Built-In Lighting Fittings. Novel types accompanied by pictures of installations are shown.

METROPOLITAN-VICKERS, LTD.—Catalogue of Electric Discharge Lamps; also lists of Cosmos Lamps, etc.

NATIONAL SAFETY FIRST ASSOCIATION.—"The Factories Act, 1937," a leaflet containing safety tables and memoranda notices of books and fifty check questions on the Act.

PHILIPS LAMPS, LTD.—New catalogue featuring many types of electric lamps, "Argenta," Colour-sprayed, Tracti, Tubular, etc.; also lighting fittings.

RADIOVISOR PARENT, LTD.—Reprint of a contribution by Col. the Hon. Arthur Murray entitled "A Modern Marvel," in which the various applications of Radiovisor light-sensitive apparatus are described and illustrated.

SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD.—New catalogue of Electric Lamps, including special varieties, Tubular, Colour-sprayed, Projection, etc.

Benjamin Electric. New Directors

We are advised that Mr. Guy Campbell, Jnr., Mr. H. L. Smith, and Mr. L. R. Kavanagh have been appointed directors of the Benjamin Electric, Ltd.

"P.A.L." Unbreakable Gas Globes

The well-known "P.A.L." (Protect-a-Lite) unbreakable gas globes, which have been on the market for nearly twenty-five years, are still deservedly popular wherever gas is used for illumination. These patented globes are of very robust construction. Besides the protection which they provide for mantles, they also serve a most useful purpose as a fire precaution—a point which, we understand, is thoroughly recognised by fire insurance companies and assessors. Retail at 2s. 6d., these "P.A.L." globes are obtainable through the usual wholesalers or from the patentees, Messrs. Pifco, Ltd., Pifco House, Watling-street, Manchester, and at Pifco House, 58, City-road, London, E.C.1.

Simplex London Premises

Alterations to the London premises of Simplex Electric Company have just been completed, and the entrance from Tottenham Court-road has been modernised and considerably improved. This now provides for the exhibition of "Creda" and "Simplex" appliances in a neat and attractive manner.

1938

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